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ABSTRACT

The traditional model of instructional development (ID) is found lacking by some in the face of problems that call for a customer/user focus, adaptable technical and social designs, and solutions where training is impractical or unaffordable. This paper outlines an alternative model based on the socio-technical paradigm, which suggests a better match to a growing number of problems in ID. From a socio-technical perspective, the purpose of design and development is to support human behavior, not to create an innovation. Organizations are composed of people using technology to perform work practices in a particular environment. Each component is integrally tied to the other, and technology is not predominant. Prototype versions of proposed socio-technical solutions are for the purpose of evaluating and refining specifications. Development, conducted by a cross-functional team of people with a stake in success, is not a one-time event focusing on technology, but a process of activity, product, and evaluation output. Seven phases of ID are proposed, with an evolutionary rather than revolutionary approach. Six figures are appended. (Contains 4 references.) (SLD)

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Title:

A Socio-Technical Perspective of Instructional Development: A Change in Paradigms

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Traditional ID models lead to an engineering-style linear planning process (see Figure 1) led by technocrats and relying almost solely on expert analysis. The implications of the traditional model are: training and performance requirements occur late in the process; training solutions are often fixes to other broken parts of the system; and human performance personnel are out of the primary decision loop. Increasingly, people find this approach severely lacking in the face of problems that call for customer/user focus, adaptable technical and social designs, and solutions where training is impractical or unaffordable. This brief paper is intended to outline an alternative model based on the *socio-technical* paradigm, which in our view suggests a better match to a growing list of problems in ID.

(INSERT FIGURE 1)

From a socio-technical perspective, the purpose of design and development is to support human behavior, not to create an innovation (Eason, 1988). Innovations are, therefore, situated in settings of complex, unpredictable, multi-form relationships among the various elements that make up a working organization. Successful technology is only one critical component among many that are highly interactive and interdependent with each other. Technology is only one component of what Moran and Anderson (1990) refer to as the "Workaday World" amd Harbour (1992) refers to as the PETT (People-Environment-Task-Technology) model of organizational processes.

From a socio-technical perspective, organizations are comprised of *people* using *technology* to perform specific *work practices* in a particular *environment* (see Figure 2) (Goodrum, Dorsey, & Schwen, 1993).

These four components can be briefly defined as (adapted from Moran and Anderson (1990)): People: The work and learning roles people play, patterns of formal and informal communication, social relationships, and so on. Environment: The physical and cultural aspects of the organization such as open or closed floor plans, virtual environments, organizational values, traditions, and so on. Work Practice: The knowledge, skills, and routines for accomplishing specific tasks associated with the work and learning roles. Technology: The technical computation, communication, and multimedia systems which support the other components.

Each component of the organization is seen as being integrally tied to the other. A change in one necessarily affects a change in the others. Therefore, organizational solutions must be planned taking all into account (Eason, 1988). Instructional developers, therefore, need to deal with creating and investigating *whole* environments, not just the technological, pedagogical, or training innovations of specific interest.

(INSERT FIGURE 2)

(INSERT FIGURE 3)

The planning process (see Figure 3) is a concurrent one that brings human performance people, as well as others who are often out of the decision loop, fully into the process. In the traditional model, by the time the decision comes down to the training and performance

people, the design my already be flawed with no chance for redesign, requiring the fitting of the people and organization to the innovation, versus the innovation fitting the people and organization.

Similarly, the socio-technical design team (see Figure 4) includes *all* of those people who have an invested interest in the success of the innovation. The key people included here are the direct and indirect users of the innovation. These are the people who must live with the consequences of the innovation long after the designers, implementers, and project managers have disappeared. Teachers and students in school and supervisors and workers in the workplace should, from a socio-technical perspective, be included from the very beginning of the decision process as well as the innovation design process.

(INSERT FIGURE 4)

Within the large scale development project there are many small scale design processes which go through a full problem solving process of iterative design (see Figure 5), for purposes of exploring options and developing a fuller understanding of the requirements.

The creation of prototype versions of proposed socio-technical solutions are for the purpose of evaluation and refinement of specifications. This allows users and others to have a realistic experience for basing assessments and revisions. Conceptual prototypes allow for early user reaction, feedback, and projection of consequences. 'Working' prototypes allow for hands-on use in the context of the task. Alternative prototypes in the early stages of development assist the team in keeping an open mind and not locking into a particular, potentially flawed, design too early.

(INSERT FIGURE 5)

In summary to this point: Development occurs iteratively, allowing for concurrent problem definition (i.e., analysis), innovation prototype creation, and evaluation. Development is conducted by a cross-functional team comprised of people who have a stake in the product's success. Development does not focus solely on the creation of technology. To the contrary, the focus is on the work practice, the relationships between people, the social and cultural environment; the technology should support the changes in the other three areas.

This process is not a one-time occurrence. Rather, it goes through successive phases (see Figure 6), each of which allows for a certain level of evaluation as well as a projection of additional levels.

(INSERT FIGURE 6)

Each phase can be described with a primary *activity*, *product*, and *evaluation output*. During the initial phase, a team *brainstorms* a *vision* and can gather data on people's *projections* concerning how stakeholders will react to the innovation, how usable the innovation might be, what performance improvements or behavior changes might result, and what impact that might have on the core business of the organization (e.g., profitability of a business, teaching and learning in schools and universities).

During the second phase, a team *shows* alternative *idea sketches* of the innovation and can gather *reactions* as well as projections of the usability, performance improvements and bottom line results.

In the third phase, the team creates opportunities for *hands-on* use of one or more partially functioning *mock-ups*, observing the innovation's *usability*, and also gathers reactions as well as projections of foreseen performance improvements and bottom line results.

In the fourth phase, the team *pilot tests* one or more alternative *working prototypes*, observing performance improvements or changes in behavior, gathering additional and more refined information on the innovation's usability as well as users' reactions, and projects bottom line results.

In the fifth phase, the team *fully implements* the completed design of the innovation, understanding that this may be only the first implementation of an *evolving vision*. One can now gather data on *bottom line results* on the core business of the organization, while gathering additional information on performance improvements, usability, and users' reactions.

The scope of a project will more likely increase than narrow as the relationships among the four components of the socio-technical system are better understood and the solutions/innovations are capable of being more substantively evaluated. Alternative prototypes, tested against one another during the early phases, will combine into a single design for full implementation.

There is also an emphasis on developing for organizational change, understanding that solutions must evolve over time. For people can only deal with so much change at one time, whether on the job or in the classroom. Furthermore, one can implement revolutionary change, but the impact cannot be predicted. Evolutionary change is required in order to have a chance at understand the resulting effects.

The successive phases of development -- each with concurrent problem analysis, development and evaluation -- become increasingly concrete. The team may progress through phases quickly, depending on a) the scope of the change, b) how informative the evaluation outputs are, c) how closely prototypes fit the needs of the individuals and organization, d) how much development from scratch is required versus use of existing or off-the-shelf materials, e) the commitment of the client and client organization, and f) how well consensus is negotiated.

Currently, in our view the socio-technical approach to instructional development is based on seven fundamental principles:

1) Socio-Technical Systems Comprised of People. Environment, Work Practice, and Technology

2) A Focus on Organizational Change, not Technology

3) A Design Team Consisting of All (or representatives of all) Stakeholders throughout the Process

4) Iterative Cycles of Design

5) Creation of Alternative Prototypes

6) Concurrent Analysis, Creation, and Evaluation Becoming *Concrete* Over Time

7) Evolutionary not Revolutionary Phases of Development

To date, our own work in developing, applying, and learning from a socio-technical approach has included a number of projects, ranging from individual instructors creating lecture presentation materials to large companies in the process of changing the way thousands of employees work and learn. In every case, the more we worked from a socio-technical paradigm, the better we were able to foresee and resolve many barriers as well as make more efficient and effective progress in the design, creation, and implementation of innovations. The socio-technical paradigm provides for ourselves an approach to development where we can still apply the skills and knowledge from areas such as instructional strategies, learning theory, etc., which in and of themselves do not provide a framework that leads to successful use. We also attempt to continuously reflect on our mistakes and failures (as well as our successes) in adjusting and refining the approach.

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Note: For a background and description of some of the projects from which this work evolved, see the November, 1993 issue of *Educational Technology*, Special issue: Articles on enriched learning and information environments.

FOR FIGURES SEE APPENDIX B